Galer, Rose

From: Rose, Jay
Sent: Tuesday, December 18, 2007 10:13 AM
To: Galer, Rose
Subject: FW: draft TRU storage comments -- halsey 2007

Attachments: TRU-Storage-comments-draft.doc

TRU-Storage-comm
ents-draft.doc...

-----Original Message-----
From: Rose, Jay
Sent: Wednesday, July 18, 2007 8:57 AM
To: 'Schwartz, Francis (NE-HQ)'; Itani, Maher
Cc: Swichkow, Deborah; Singh, Bhupinder; Wheeler, Jack; Perry, Jeffrey; Jones, Leon (NE-HQ)
Subject: RE: draft TRU storage comments

While the attached information provides some helpful info, it does not really explain how big the TRU storage facility would need to be... I think we need a rough estimate of the acreage/facility size that would be needed to store TRU for the Modified Open Fuel Cycle Alternative. It would be helpful if we could estimate the nominal size needed to store 500 MT of TRU

Note: I arrived at the 500 MT figure as follows: 1000 MT/yr LWR SNF input to recycling center, yielding approximately 10 MT of TRU/yr, multiplied by 50 years of operation....

-----Original Message-----
From: Schwartz, Francis (NE-HQ) [mailto:Francis.Schwartz@hq.doe.gov]
Sent: Monday, July 16, 2007 3:19 PM
To: Itani, Maher; Rose, Jay
Cc: Swichkow, Deborah; Singh, Bhupinder; Wheeler, Jack; Perry, Jeffrey; Jones, Leon (NE-HQ)
Subject: draft TRU storage comments

Maher and Jay,

I'm not sure if you have this one or not, from Bill Halsey

Frank

Comments on Transuranic Storage
WGH 6/27/07

Summary Notes:

- Mixed transuranic storage at the scale needed by GNEP is beyond current (or past) practice and will require development of new capability.
- Experience with other radioactive material storage provides a useful basis for planning.
- Quantities per package must be limited for criticality and decay heat limits. Limits are likely to be in the kg/package range.
- This material will require secure and monitored storage.
- The TRU product can be stored in a metal form, loose oxide, or pressed oxide.
- A custom storage facility will be needed, probably inside the separations plant of the fuel fabrication plant.
- There should not be any technical 'show-stoppers'.

General Observations:

It has been noted that in a GNEP 'Modified Open Fuel Cycle' there would be need for extensive and extended storage of separated transuranic product material. In addition, other potential closed fuel cycles will require significant interim TRU product material storage, although not of the scope or duration of the Modified Open Fuel Cycle. These requirements raise questions about the nature of the product material storage.

Storage of significant quantities of mixed transuranics is not currently performed. Extrapolation of existing storage methods may be sufficient for small=scale and medium-term storage. Large-scale and long-term storage of separated TRU product has been identified as a technology that requires significant development.

There is extensive experience in extended storage of separated Pu, both reactor grade and higher, in the US and other countries. A useful experience base is the French Pu storage, although not at the scale of GNEP, nor with the higher actinides included. Np, Am and Cm have been stored in small to medium quantites, usually as either individual high-purity elements or contained in irradiated fuel or targets, or in dilute waste streams. A mixture of reactor grade Pu, Np, Am, and Cm presents a new challenge – no one has ever needed to store such a mixture in significant quantities. The technical challenge includes simultaneously coping with heat output, radiation emissions, criticality limits and security requirements.

Existing containers such as the 3013 package, can hold kg quantities of Pu, based on various criticality safety, heat generation and material security limits. Both the container and existing shipping overpacks such as the 9975 have thermal output limits (tens of watts). A mixture of reactor grade TRU could be limited to sub-kg contents per container. For scale, think of a container of paint can size and shipping packages of large

garbage can size. The Modified Open Fuel Cycle could result in storage of tens to hundreds of tons, depending on the rate of Pu recycle. At this scale, innovative storage to manage criticality and decay heat for larger quantities may be desired to avoid storing tens to hundreds of thousands of packages. Use of an extended storage matrix (metal or ceramic) with neutron absorbers and good thermal properties is one option.

For storage of the scale and duration to support the Modified Open Fuel Cycle, custom policy, law, regulation, standards and practices must be developed. This would probably result in design, construction and operation of a dedicated TRU product storage facility. Such a facility is likely to require thousands of storage locations, shielding, heat rejection and active high security. Technically, such storage should be readily achievable, but solutions are unlikely to be quick, easy or inexpensive.

Initial facilities operated under government auspices could borrow heavily from past and present storage of significant quantities of Pu, small quantities of other transuranics, Pu-238, significant quantities of U-233, and concentrated fission products (Cs/Sr, etc). Existing packages, methods and protocols could be modified to cover these materials. Existing security methods are adequate. However, at large-scale, these modified current practices would probably not be optimal, and development of custom capability should be planned for. Finally, to enable such storage as a commercial activity, a legal and regulatory basis will have to be developed.